

Tukkie

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Prof Cheryl de la Rey: People at heart

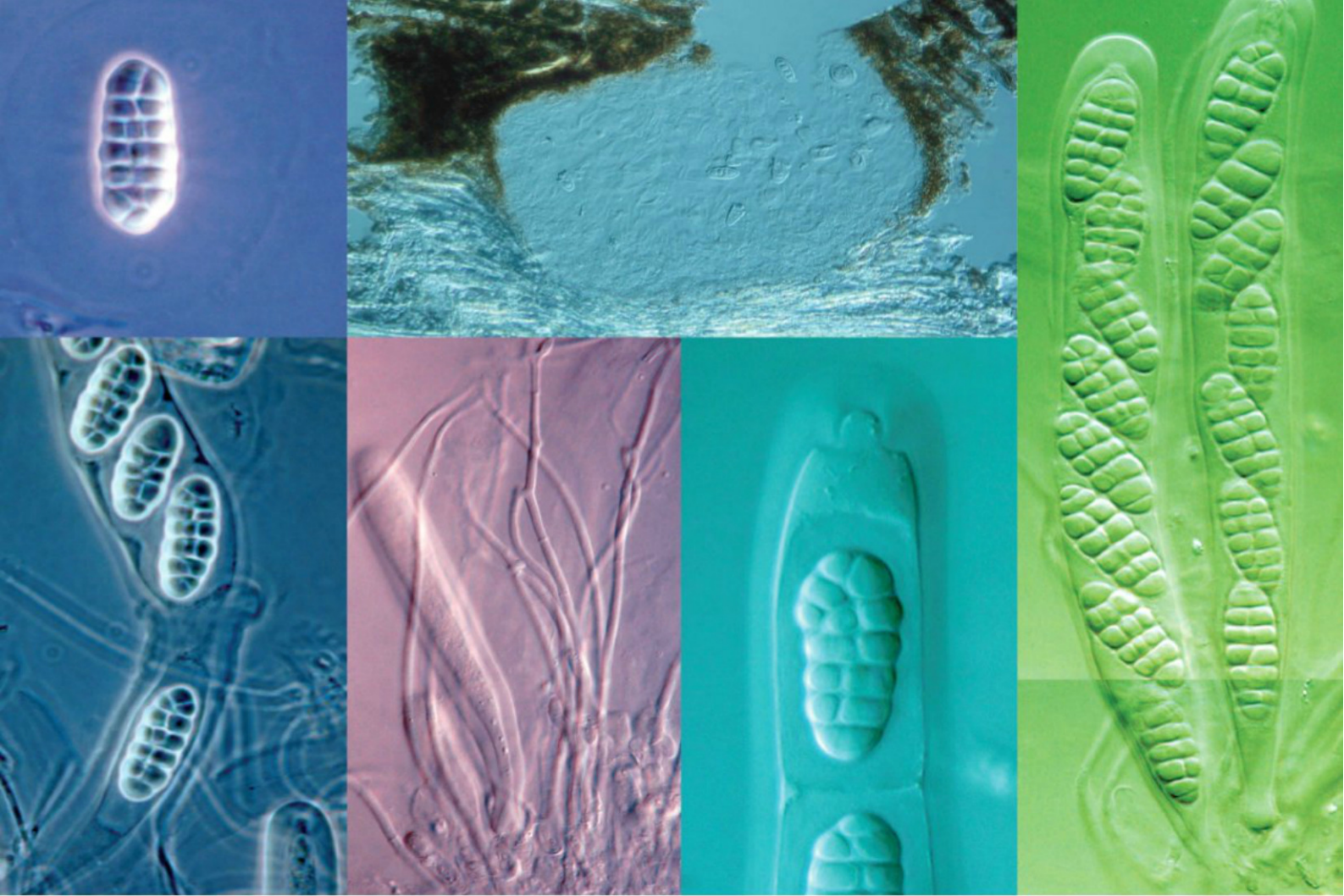
Hatfield-gemeenskapshof help teen misdaad

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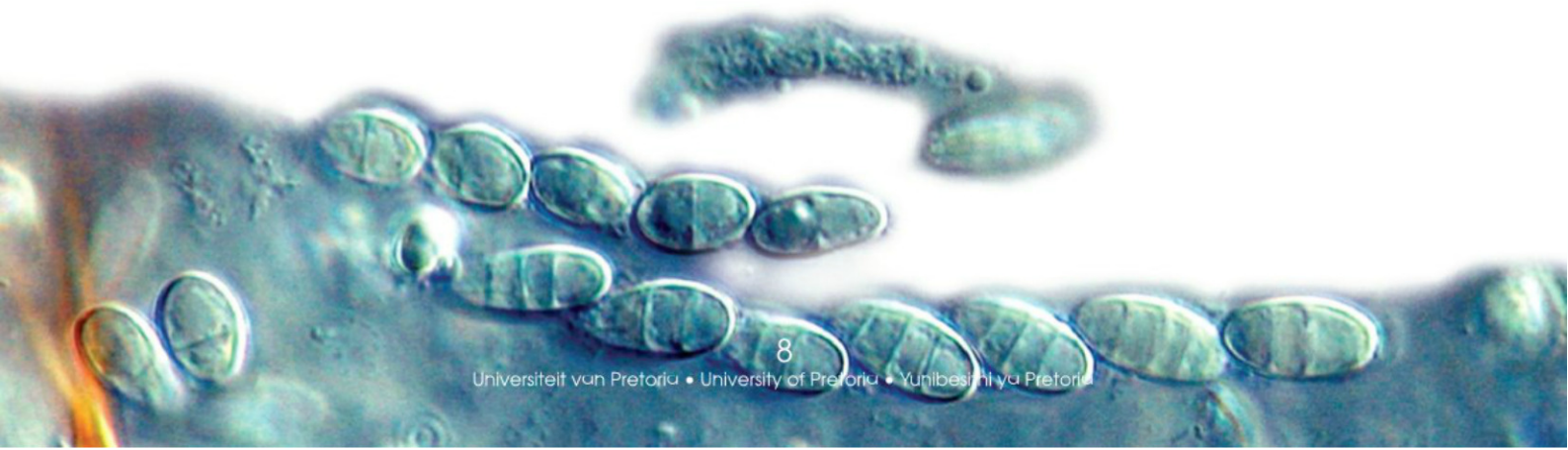
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Maestro meets fungi in UP

They are without doubt the mightiest kingdom on earth and although miniscule in size, have been the cause of some of the biggest catastrophes recorded in the history of mankind. They have also been at the forefront of some of the most prolific breakthroughs in medical history and have already saved millions of lives.





◀ In honour of the University of Pretoria's centenary celebration and the Forestry and Agricultural Biotechnology Institute's (FABI) tenth anniversary, two new fungal species were named. The fungus named in honour of FABI is known as the *Julella fabiana*.

In fact, says Prof Michael Wingfield, Director of the world renowned Forestry and Agricultural Biotechnology Institute (FABI), without them man cannot exist.

The path of this mighty force, known as the Kingdom of Fungi, recently crossed that of the University of Pretoria. Fortunately for Tukkies, they came in "peace".

In 2008 UP became the first university in the world to have a fungus named after it. This fungus, described by Prof Wingfield as a "beautiful flower" is known as the *Lentomitella unipretoriae* and was named to celebrate the University's centenary. A second fungus, known as *Julella fabiana*, was named in honour of FABI, who celebrated its 10th birthday – also in the centenary year of the University.

FABI has been at the forefront of research on the impact of fungi on the health of plantation trees and also native trees including the baobab, kiaat, marula and Proteaceae or Cape Fynbos.

Since its inception in 1998, FABI has been credited with the discovery of three new Bacteria species, two fungal families in 15 genera, which included 225 species, as well as three insect species.

Discovering new species

The discovery of the two new fungal species was the result of a twelve-year research project undertaken in the Western Cape, and led by "mycological maestro" and FABI post-doctoral fellow Dr Seonju Marincowitz. The study included the sampling of 29 species

and sub-species belonging to four genera of *Proteaceae* in the Western Cape.

New fungal species are discovered at a rate of between 500 – 1 000 per year. To date "only" 75 000 species have been discovered. It is estimated that there are more than 200 000 species in southern Africa and approximately 1,5 million worldwide. This means that less than 5% have been discovered.

According to Prof Wingfield, the main reason why so "few" species have been discovered is mainly due to a lack of funding, which, in turn is the result of a lack of focus on these incredibly important and small organisms.

"They are often overlooked in favour of the bigger ones such as elephants and baobabs," he says.

In addition, the discovery of important new fungal species can be extremely difficult due to their size and the fact that years of experience in this research field and, these days, relatively complex DNA comparisons are required.

Naming a fungi

When a new fungal species is thought to have been discovered, it has to be cultured, keyed-out, DNA sequence must be generated and it must then be compared to all known species.

The FABI team that works on fungi has had a major advantage in being one of the first in the world to apply DNA sequencing to their studies.

This beautiful “fungal flower” is known as the *Lentomitella unipretoriae*, named to celebrate the University of Pretoria’s (UP) centenary.

This is largely thanks to Prof Brenda Wingfield, Programme Leader of the Department of Science and Technology – National Research Foundation Centre of Excellence in Tree Health Biotechnology and recently appointed Deputy Dean: Research and Postgraduate Studies in the Faculty of Natural and Agricultural Sciences. She introduced DNA sequencing to the South African plant pathology community as early as 1988.

“Having an early start to being able to differentiate between various characteristics at a level not previously possible has substantially boosted research at FABI.”

The names of all known fungal species are kept in an international central databank known as Mycobank, which makes comparisons effective. As is true of most of taxonomy of any groups of organisms, mycologists rely on specialists who have spent many decades becoming familiar with specific groups of fungi. In this regard, an international team effort makes the wheels turn.

“We check each other through collaborative efforts and international peer review, which sometimes requires a thick skin, but this is crucial in terms of maintaining quality and excellence,” says Prof Wingfield.

The naming of the two new fungal species is intended to honour a great University and a fantastic institute, says Prof Wingfield.

Their descriptions have been included in an internationally published book *Microfungi occurring on Proteaceae in the fynbos* with Seonju Marinowitz as the lead author and Pedro Crous, Johannes Groenewaldt and Prof Wingfield as co-authors.

Various rules apply before a new fungal

species can be named. The rules include, for example, the availability of illustrations, a detailed description as well as a Latin description. The detailed descriptions are typically supported by DNA sequence data.

What are fungi?

To the unenlightened the Kingdom of Fungi is not as impressive as its counterparts, the plant and animal kingdoms, but those in the know realised their importance and value long ago and that is why they reside in their own independent kingdom.

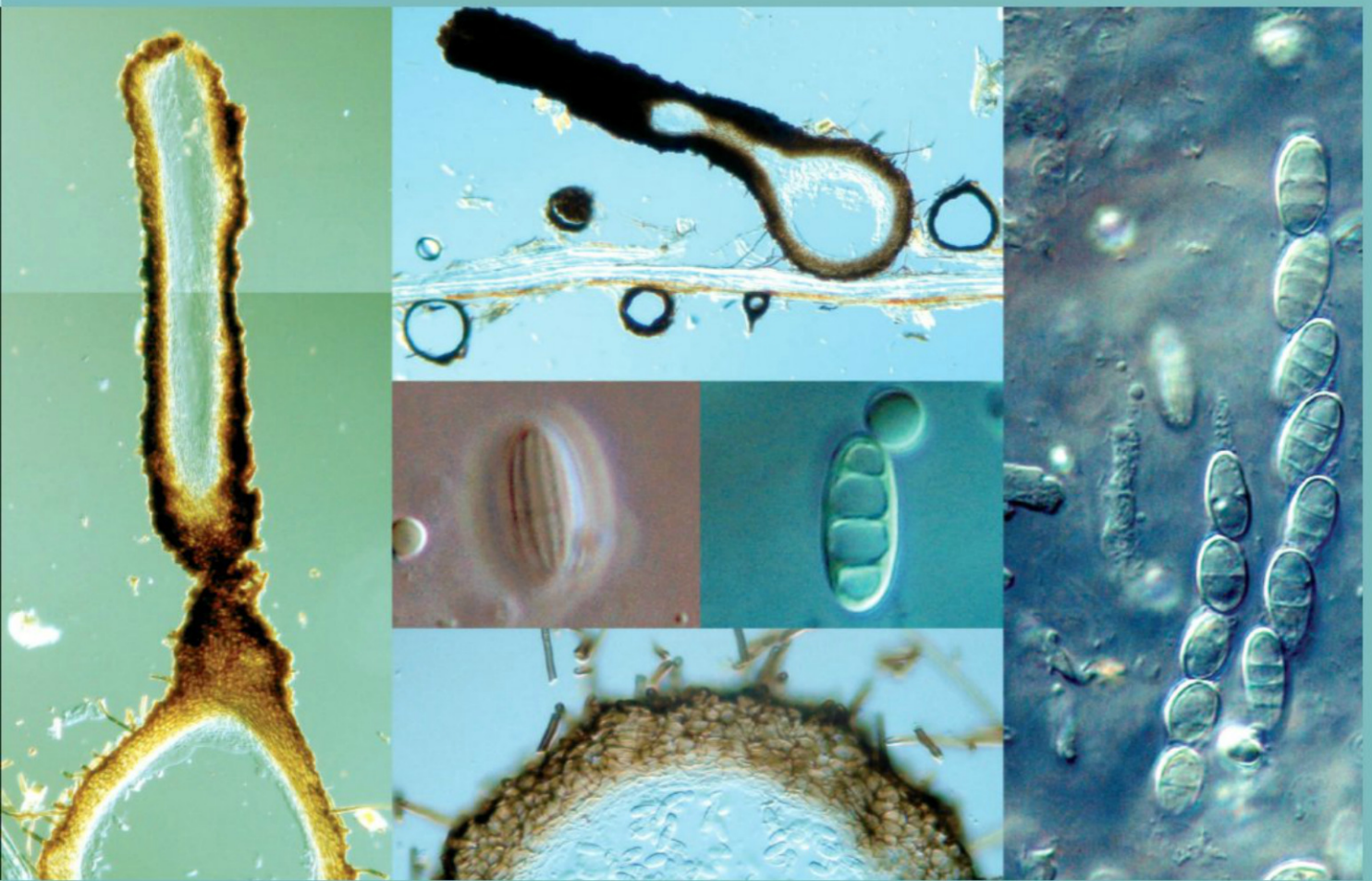
According to Prof Wingfield, most people mistakenly believe that fungi are plants. They are actually much more closely related to insects. This discovery also came from relationship studies based on DNA sequence comparisons and Prof Wingfield likes to think of them as “insects without legs”.

Fungi are everywhere – in soil, water, living and dead plants, petrol, air and even on rocks and coral. Without them everything on earth – humans included – would be covered in “rubbish”. The most important role of fungi is that they are the world’s great decomposers.

All fungi are heterotrophic and are either single or multi-cellular. Heterotrophic means that fungi do not have chlorophyll and can therefore not produce their own food. They have to digest other organisms to produce energy and are either Saprophytes (attack dead organisms) or Parasites, which prey on living organisms.

The good, the bad and the tasty

Fungi are either good or bad, says Prof Wingfield. “Good fungi”, in which the *Lentomitella unipretoriae* can be categorised,



led to the discovery of Penicillin, which was first discovered in mold known as *Penicillium notatum* by Scottish bacteriologist Alexander Fleming in 1928.

Penicillium only came in use in the 1940s when Howard Florey and Ernst Chain isolated the active ingredient and developed a powdery form of the medicine.

Penicillin is often described as a miracle drug, because prior to its discovery trivial injuries and diseases often meant a death sentence for patients.

Fungi are also used in the treatment of varicous veins, in the manufacturing of allergy medications and cortisone, as well as biological agents to control weeds and pests.

The destructive capacity of "bad fungi" was clearly demonstrated during the Great Famine of 1845, when potato blight (*Phytophthora infestans*) destroyed Ireland's entire potato crop within seven days. As a result, more than a million people died due to starvation and more than a million immigrated to Canada and the USA – reducing the Irish population by 25%.

In the late eighteen-hundreds the French wine industry was almost brought to its knees by the "insignificant" fungal disease known as Downy Mildew. The disease - characterized by grey, velvety patches of spores on the lower surfaces of leaves - led to the development of the first chemical pesticides used on plants.

Apart from mushrooms, fungi have also been used in the production of some of our favourite food and beverages including wine, beer and some of the most delicious French cheeses such as Roquefort and Camembert.

The latter is made from unpasteurised cow's milk, and is ripened by the moulds *Penicillium candidum* and *Penicillium camemberti* for at least three weeks.

And like all good stories about royalty, the tale of the Kingdom of Fungi would not be complete without love. Legend has it that Roquefort cheese was discovered when a youth, upon seeing a beautiful maiden in the distance, abandoned his meal in a nearby cave to follow her. When he returned a few months later, the mould had transformed his plain cheese into Roquefort.